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Keeping the Bubble Alive!
The Effects of Urban Renewal and Demolition Subsidies in the East German Housing Market

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Autor: *Dominik Weiss*

Department of Urban Economics

E-mail: Dominik.Weiss@iwh-halle.de

Phone: +49 345 77 53-781

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Hausanschrift: Kleine Märkerstraße 8, 06108 Halle (Saale)
Postanschrift: Postfach 11 03 61, 06017 Halle (Saale)
Telefon: (0345) 77 53-60
Telefax: (0345) 77 53-8 20
Internetadresse: http://www.iwh-halle.de

Keeping the Bubble Alive! The Effects of Urban Renewal and Demolition Subsidies in the East German Housing Market

Abstract

German urban renewal programs are favoring the cities in the Eastern part since the reunification in 1990. This was accompanied additionally by attractive tax incentives, designed as an accelerated declining balance method of depreciation for housing investments during the 1990s. The accumulated needs for comfortable housing after 40 years of a disastrous housing policy of the GDR era were generally accepted as justification for the subvention policy. But various subsidies and tax incentives caused a construction boom, false allocations, and a price bubble in Eastern Germany. After recognizing that the expansion of housing supply was not in line with the demographic development and that high vacancy rates were jeopardizing housing companies and their financial backers, policy changed in 2001. Up to now, the government provides demolition grants to reduce the vast oversupply. By means of a real option approach, it is explained how different available forms of subsidies and economic incentives for landlords lift real estate values. The option value representing growth expectations and opportunities is calculated as an observable market value less an estimated fundamental value. Empirical results disclose higher option premiums for cities in Eastern Germany and a strong correlation of the option premium with urban renewal spending.

Keywords: Real Option, Housing Market, East Germany, Urban Renewal Subsidies

JEL classification: R0, H2

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Zusammenfassung

Seit der Wiedervereinigung werden die Städte in Ostdeutschland bei den Programmen der Wohnungsbau- und Städtebauförderung finanziell begünstigt. In den 1990er Jahre wurde dies durch degressive Abschreibungsmöglichkeiten für Immobilieninvestitionen ergänzt. Die Instrumente der großzügigen Wohnungsbauförderung sind vor dem Hintergrund der aufgestauten Bedürfnisse der Bevölkerung nach ausreichenden und komfortableren Wohnungen, die von der DDR-Wohnungspolitik nicht erfüllt werden konnten, zu verstehen. Der resultierende Bauboom führte jedoch zu Fehlallokationen und ließ eine Immobilienblase in Ostdeutschland entstehen. Nachdem dies erkannt worden war, änderte sich die Politik und gewährte ab 2001 mit dem Programm „Stadtumbau Ost" Abrissprämien, um das Überangebot an Wohnraum zu beseitigen. Die Motivation und die Folgen dieser Subventionspolitik für Wohnungseigentümer, Investoren und das Immobilienpreisniveau werden mit einem Realoptionsansatz untersucht. Es wird analysiert, wie die verschiedenen Subventionsformen Immobilienwerte erhöhen, und anhand von Fundamental- und Optionswerten gezeigt, dass bis heute eine Preisblase auf dem ostdeutschen Wohnungsmarkt existiert.

Schlüsselwörter: Realoption, Wohnungsmarkt, Ostdeutschland, Stadtumbau

JEL-Klassifikation: H2, R0

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Introduction

Due to the demographic shrinking process in East Germany, the government gives grants to house owners for demolishing their vacant flats and therewith reducing the housing over plus. The demolition grant is about 60 Euro per square metre (sqm) of reduced living space. In combination with a partial bail out regulated by a special law for old inherited depths is given a big incentive for demolition (GdW 2005 p. 150). Between 2002 and 2007 more than 193,000 flats have been demolished, mostly in big blocks of flats that were build in the socialist era of the GDR (Liebmann et al. 2007 pp. 23 et seq.) The owners of these so called "Plattenbau" flats are mostly big local public housing companies or cooperative societies.

This policy meets a market which performance and vacancy rates disappointed the expectations of many investors. Modernization of flats and the number of new buildings has broken down and remains on a very low level. This holds also for the number of housing transactions, apart from some opportunistic portfolio deals of foreign investors. Obviously the landlords that invested a lot of money now try to minimize their equity losses and can react on lower revenues und vacancy risks with or without subsidies.

This paper examines with a real options approach how subsidies and economic incentives lift up property values and influence the investors´ decisions because the advantages of different options for action may be distorted by subvention. The considerations made in this paper refer predominantly to renters and landlords. Proprietors who live in their own condominium or single house are not addressed.

Section 2 gives a brief outline about the historical background and the later outcomes of the various market interventions and subsidies given to the East German housing market. Section 3 outlines the real option characteristics of a property and concretizes selected options. Section 4 applies the real option concept to show theoretically how urban renewal subsidies can modify the value of a property. Section 5 presents a method to assess the valuation of property real options. Section 6 presents the empirical results and Section 7 concludes with a discussion about implications for the urban renewal policy.

1 The Genesis of a Bubble

Instead of the West German real estate market with a seamless tradition of a rather free market with different moderate housing policy instruments the East German housing market was state controlled until the reunification in 1990. Reports on the economic and physical structure revealed a disastrous state of the historic housing stock as well as a preceding dilapidation in the big blocks of panel flats constructed between 1970 and 1990. Many historic buildings were uninhabitable and at risk to collapse. The stately fixed rent level of about 1 Mark per sqm was far away to break even. As a consequence maintenance and reinvestment were neglected. The political and economic breakdown of the GDR Regime is partially attributed to the inefficient housing policy (Jenkis 1996 pp. 673 et sqq.). In the first years after the turn around unanswered questions of ownership caused problems. Longsome modalities and judicial procedures of restitution were obstacles for urban development (Osenberg and Waltersbacher 1997). The challenge of transformation to the West German system was a balancing act between economic, social, legal and structural aspects for the policy, landlords, town planning and other market actors. One can divide this process roughly in two phases of boom and consolidation.

1.1 Boom and Expansion in the 1990s

To get out of the unbearable situation, a package of measures was set up to improve the East German housing stock very fast und comprehensively. The adaption of the low rent levels of the existing housing stock to a free competitive rent system was regulated until 1998 by a transformation law with a stepwise rent increase (Jenkis 1996, pp. 713 et seq.). Urban renewal programs existed for city centres, local public and cooperative housing companies and historical buildings. The investment in housing and commercial real estate was boosted not least by an enormous tax incentive provided by the assist area law. Between 1992 and 1998 it was possible to write of 50 percent of a real estate investment within the first 10 years. The intended effect was an enormous stream of capital from west to East Germany, because a many better of West Germans used this way to lower their tax rate. This situation made it easy to issue closed end investment companies, which were often designed just for exploiting the tax effect.

As a result of the tax induced demand for housing investment property prices in East German cities were increasing and uncoupled from the development in West Germany (Reichsthaler 2006). This and the continuously increasing rent level during the 1990s stimulated a euphoric sentiment on the real estate market. Hence, investors bought more and more inferior properties in bad locations or just superficially renovated blocks of flats without having a look at the property and its surroundings in reality.

More indicators for an upcoming housing market bubble offer statistics. Regarding the development of fundamental economic figures like the purchasing power or the unemployment rate in East Germany is likely that the living conditions and local amenities are not in line with the nominal East German rents, which have reached nearly West German level (Weiß 2008a). Between 1995 and 2000 renovation of flats and new construction of single family homes enlarged the housing stock by 8.3% while population drops by 2.1% in the same time.

Vacancy rate increased very quickly and many investors became disappointed with the performance of their portfolio and the loss of equity. The dramatic situation of 1 Million vacant flats in 1998 was disclosed in a report on the East German housing market. However, approximately 500 000 flats were not offered in the market due to the uninhabitable conditions or temporary closedown by the landlords. (Pfeiffer et al. 2000, p. 20). Not only private landlords suffered by the high vacancy rates. Local public and cooperative Housing companies which are controlling about 50% of the rented flats in East Germany were affected by a great extend too. They had renovated their housing stock with a high leverage and into the bargain they were burdened with inherited credits. As legal successors of the GDR housing companies their depths by the GDR state bank were transferred to the German Federal Bank. Many of the housing companies were bearing losses due to operating costs of vacant flats and were at the edge to insolvency a couple of years after the new start-up in the early 1990s.

1.2 Consolidation since 2001

But the vacancy was not alone an urbanistic issue or a business problem of the housing companies. Banks were strongly engaged in financing the East German real estate boom. Alone the state owned bank KfW that handed out 40 Billion Euros (Reich 2000). The big amount of nonperforming loans has led to some restructuring and mergers between affected banks and attracted private equity firms like Lone Star and Oaktree inc. to invest in the bad dept (Businessweek 2005). While most private banks could escape the crisis in this way it is assumed that the federal state had a bigger problem. A bankruptcy of the housing companies would not only bring losses to the creditor KfW. It could rather cause damage to the financial and economic stability of the cities as owners and bailers of the housing companies. Therefore federal government has strong incentives to keep the bubble alive and to install aid for a very soft landing. In other words government's stabilization objective means maximizing aggregate rents and landlords' incomes while accepting possible overall welfare losses caused by price distortions (Dascher 2006).

An expert commission recommended the demolition of 300,000 to 400,000 flats within 10 years to stabilize the housing market (Pfeiffer et al. 2000). To prevent the crash government created instruments like the demolition subsidy of the urban renewal program with the euphemistic name "city redesign" (Stadtumbau) an investment grant for inner

city areas and aids for the adaption of supply infrastructure. Additionally existing urban renewal programs were extended. Up to now the amount of urban renewal spending in East Germany is 186 Euro per capita between 2000 and 2005. This is more than seven times higher than in the west, where urban renewal spending reaches only 25.2 Euro per capita in the same term (INKAR 2008).

About 220,000 flats have been demolished in the programs first run since 2001. An interim evaluation of the program shows that vacancy rates are slightly declining especially in the areas of socialist panel flats (Liebmann et al. 2007, pp. 24 et seq.). But what happens to the prices and rents on the housing market? The presumption that the bubble, originated in the 1990s, still exists is shown with the analysis of the basic values and option values which can be calculated with a real option approach.

2 Real Options in a Property Context

An Option gives the owner a well defined right. In the case of financial options it is mostly the right to buy or to sell an amount of stocks or a currency at a preassigned price within or at the end of a fixed period. According to the option pricing theory the value option depends of the market price of the underlying, its volatility and the time to expiration. The concept of real options goes back to Myers (1977) and transfers the theory and methods of securitized financial options to the real economy. As a valuation method for investment projects under uncertainty it has some advantage compared to the classical discounted cash flow method. The concept of real options and circumscribes the huge number of different options and action possibilities in connection with investment projects. For example, an investment could be extended if the return is favorable or be abandoned if it generates losses. Another common real option is the possibility to switch the outputs or inputs of a production plant. Real estate property contains a bundle of development alternatives too.

Before I present the model to characterize the option value, the next section gives a short review of literature that employs the concept of real options to land and property markets.

2.1 Property Real Options in Economic Literature

Different questions in real estate economics have recently been addressed by real option techniques. Titman (1985) provides a prominent application that adapts the classical methods and formulas to valuate options and derivatives that were developed by Black and Scholes (1973) and Merton (1973). Assuming risk neutral investors Titman showed that, the expected future value of vacant urban land is increasing with higher uncertainty and that it may be advantageous to wait for additional information before deciding upon the size and other details of an irreversible building project. This work explains the existence of free properties in expensive and densely developed areas and shows that speculative behaviour of the landlords is rational. Also Clarke and Reed (1987) assess the option value of vacant land. Other studies address furthermore the question of an optimal date of abandonment (Williams 1991).

Quigg (1993), Yamazaki (2001) as well as Kanoh and Murase (1999) performed empiric studies to value the option that is incorporated in vacant land.

The earlier theoretic studies refer an option value only to undeveloped land. Since buildings are durable but replace capital Capozza and Li (1994) model land-redevelopment decisions with the possibility to adjust the capacity or to change the development type e.g. residential or commercial. Downing and Wallace (2001) test whether improvement investments of home owners are in line with real option theory. Another strand of studies focus on game theoretic models that allow discussing the option exercise strategies

in a competitive environment (Grenadier 1996, 2000; Cortelezzi and Giannnoccolo 2006; Wang and Zhou 2000, 2006). In multiplayer games the possibility of pre-emption by competitors changes the exercising behaviour of the investors (Grenadier 2002).

2.2 A simple Property Real Option Model

Basically urban land gives the owner the right to build according to the local zoning laws. This means, that she has the opportunity to build, but she does not have to build. This right is durable and tradable because it is generally not limited to a person nor it has an expiry date. If the property is built, there is the possibility to renovate, upgrade in quality or size, demolition and redevelopment or to sell the property. These possibilities are also considered as real options for the owner. The price of the property should refer to the capitalized revenues (e.g. rents) and the value of the bundle of options.

In the real option model presented by Sotelo (2001) the value of a property consists of different value elements. Similar to the DCF method the earning rate *(E)* is calculated as the capitalized revenues of a planned building. This net present value is assumed as a secure profit. Fix construction costs *(C)* can be seen as the execution price to realize this profit. The difference between *E* and *C* is the intrinsic value *(I)* of the real option.

$$E - C = I$$

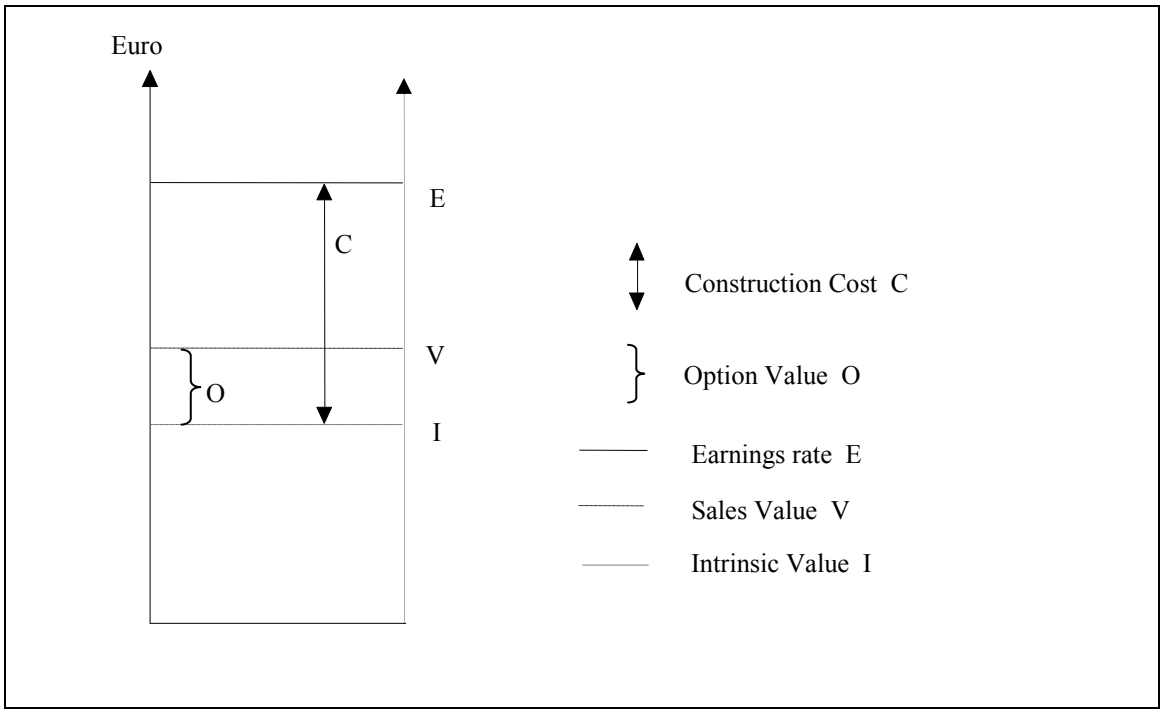
The intrinsic value I can also be calculated as the net present value of a secure project. If $I > 0$ the real option is in the money. As an example one could imagine a planned building project with existing rent contracts. But the intrinsic value would not be an acceptable price for the owner to sell the property. Usually the sales value *(V)* of the property is higher than guaranteed by the intrinsic value, due to the volatility of revenues and an expected higher profit. Some riskier projects, for example a bigger apartment house or an office building with higher revenues, are possible instead of the planned safe building project. It may be attractive to wait with the development of the property and to invest later in a more profitable building (Titman 1985).

The chance for higher revenues with another building has a value for the owner and is connected with the property not with the planned building. This is the option value *(O)* of the property and refers to the difference between sales value and intrinsic value.

$$O = V - I$$

This premium is very important in the concept of real options. The option value of a real estate property contains all unsecure expectations for a higher demand in the future. The option to invest later and these expectations make waiting for higher revenues and speculative behavior rational.

Figure 1:
Value Elements of the Property as a Real Option



Source: Author.

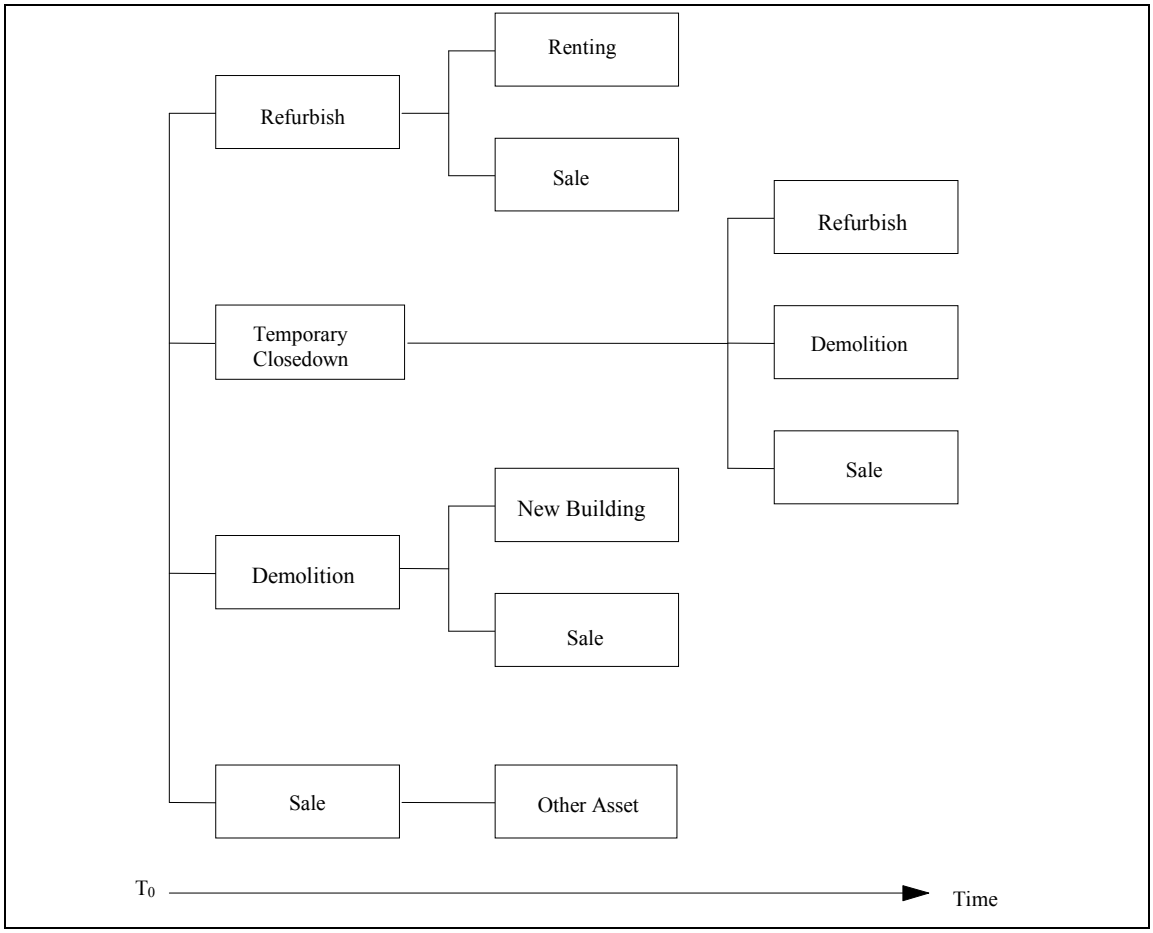
Due to the indelibility of land the options related to a real estate property have no temporal limitation. For that reason a property will have some value all the time, provided that there is no heavy contamination or other severe adversity. But the option value of a property can change. A big part of the premium will be destroyed with the construction of a building. Lower land prices for built properties than for free properties supports this idea empirically (Quigg 1993). However, after the construction the land-value of a developed property is not zero. The bundle of rights and flexible real options associated with the indestructible urban land allow opportunities to redevelop and to change the usage. The value of the option to build for example regenerates with the depreciation or demolition of the building. The Following section describes the landlords possible real options associated with a house or flat on a build property.

To demonstrate the real option characteristic of a property the right to build on a free lot is quite useful but most of the property is build. Therefore the next chapter provides an overview to the options of landlords with build properties.

3 The Real Options of Private House Owners

As mentioned above we focus on landlords which are renters. Figure 2 shows the real options of a landlord with a flat or a house in a simple decision tree. The owner has to maximize the expected cash flow and he has to consider that present actions determine the options in the future. The scheme is not conclusively but it contains the most famous real options that have been frequently discussed in the literature. On the right side re-generating real options might be added with ongoing time.

Figure 2:
Real Options of Private House Owners



Source: Author.

3.1 Option to Refurbish or Expand the Building

One of the owner´s real options is the refurbishment of the building. By upgrading to a higher quality segment higher rents can be realized. It can be seen as the option to acquire the revenues of the refurbished building. If housing demand is expected to increase in the

future, the value of this option goes up too. The option to expand is quite similar to the building option of a free lot. The investment cost for an additional storey or a better Quality of the flats are the price to gain the present value of the additional rent revenues.

3.2 Option of Temporary Closedown and Reopening

The option of temporary closedown allows mothballing a building to minimize its operating costs. If rents in the future are rising again the owner will restart the tenancy. The effects of this strategy are visible in East German cities, where windows and doors of many houses are bricked and the lines for water or electricity are disconnected. The value of the option lies in the possibility to bridge a time of low revenues. A project with this option would be more valuable than the same project without it. The fact that exercising this option maintains all other options in figure makes it very popular in bad performing housing markets like in East German towns (Weiß 2008b).

3.3 Option to Demolish

Demolishing a building reconstitutes the state of the property to a free lot. There are two possible scenarios as driving forces to demolish a building.

1. A new building on the same property is so profitable, that its return exceeds the demolition costs and the value of the current house.
2. High operating costs cause a negative cash flow and make the demolition reasonable.

In the first case the demolition is not a disinvestment, but part of the construction cost of the new building. In other words the option to demolish can be considered jointly with the option to redevelop the property. The sales value of the property after demolishing rises by the cost of demolishing.

The second case is a real disinvestment and generally not very probable because of the existing option of temporary closedown. The cost of mothballing must be much higher than the cost of demolition. Demolition without the possibility of redevelopment is mostly connected with a loss of potentially valuable assets. That means that demolition is not rational even with a subsidy that neutralizes the cost of demolition.

3.4 The Selling Option

This is the classical mode of disinvestment. With a sale the landlord is able to switch his capital to another asset whatever it will be. The sale of a property reveals the market value of a property. With the price that is paid for the property the owner acquires the intrinsic value and the premium, that is the value of the bundle of real options.

4 Effects of Subsidies on the Real Options

The Options mentioned above exist generally with or without the subsidies by the "Stadtumbau"-program. But the concept of these options is helpful to show how subsidies as a change of institutional conditions will change the value of the property. It is remarkable, that for any of the presented real options exist an adequate subsidy.

At first we will look at the demolition subsidy effect on company level. Since the demolition subsidy should reduce housing oversupply, the redevelopment of the same property after a subsidized demolition is generally not allowed. This means that demolition would not be rational as seen in Case 1 of Chapter 4.3. But a special group of housing companies that were affected by extremely high vacancy benefits additionally in a kind of demolition swap by a partial abatement of their inherited depths. In this case the demolition of one property may enhance the cost structure and overall performance of the company´s portfolio. Exercising the demolition option in is now rational because remaining properties of the company will be more valuable, due to lower costs, lower vacancy and perhaps higher rents.

As discussed in 4.3 Case 2 claiming of demolishing grants without the possibility of quitting the debts is only rational if a new building or another profitable subsequent usage as parking or as a garden for adjacent property developments is imaginable. In this case the investor of the new development has to buy the property and to calculate the demolition costs and reduces his offer by the cost of demolition. If there is a demolition subsidy the investor has lower cost to prepare the property for a new building and the current owner will expect a higher price in case of sale. That means that the demolition subsidy increases the intrinsic value of the property.

But the demolition grant does not only have this direct effect on the demolished property itself. The option to refurbish or to expand a building of other landlords in the town becomes more valuable by the demolition subsidy that may stabilize rent revenues by reducing oversupply. But the effects on other landlords and on the value of their properties are indirect, uncertain, difficult to quantify and rather delayed. Therefore, the accomplishment or just the announcement of such measures lifts up the option value of the property

This effect can be attributed as well to the improvement subsidies. These measures are basically dedicated to change the image of a neighbourhood and to stimulate demand for flats and in this area and finally to rise rents as well. These subsidies for improving the surrounding urban area, enhancement of infrastructure, new pavement or greening up public spaces are typically spend by the public authorities (Liebmann et al. 2007, p. 26).

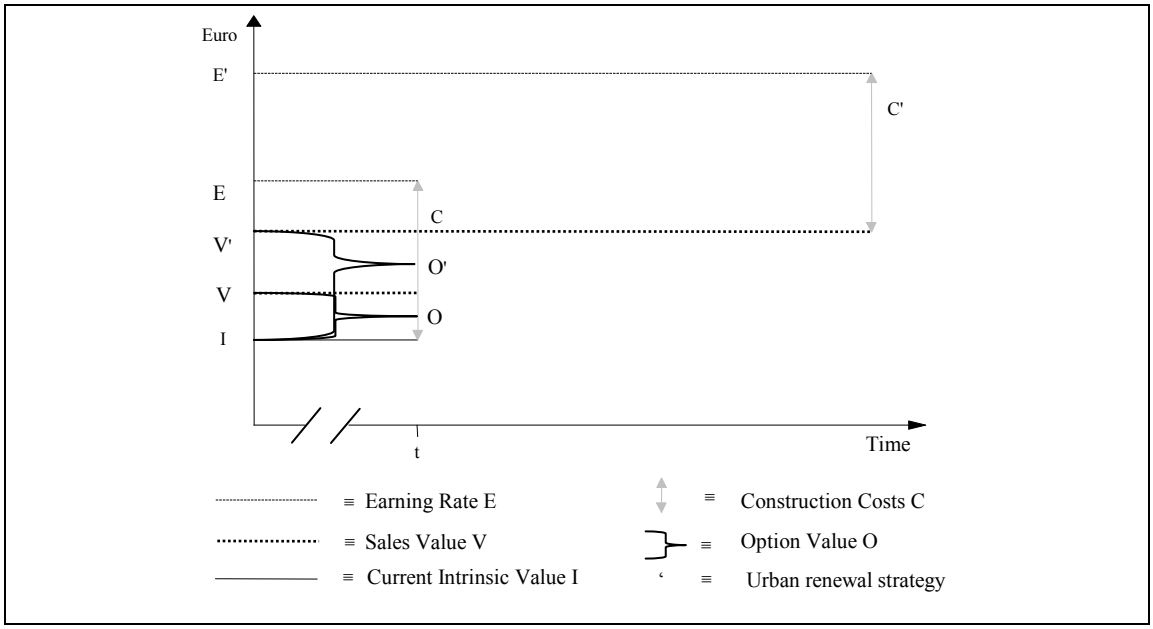
The landlords mostly do not have a lot of influence on the distribution of improvement and demolition subsidies. But from these urban renewal interventions evolve a rising-value expectation. Figure 3 shows the modification of the property´s values schemati-

cally. It starts with a similar constellation like in Figure 1 which represents a depressive market after a crashed bubble. High vacancy and moderate rents allows a quite low earning rate (*E)*. With fix construction costs (*C)* results an intrinsic value (*I)*. The Difference between the current sales value and intrinsic value is the premium value of the property:

$$V\text{-}I=O$$

With demolition and other urban renewal measures in the neighborhood, that may start at point *t* the situation changes. Landlords and investors may believe that the earning rate of his property will be one day as high as it once was before the market in his town crashed down.[1]

Figure 3:
Values of the Property with Urban Development Measures



Source: Author.

This optimistic but fictive future earning rate is marked by *E'*. Due to the elusive effects of most the urban renewal measures the intrinsic value shows no short-term reaction. The fundamental market situation and the type of housing and the architectural and urbanistic surrounding stay equal in the short run. But with the rising-value expectation the owner requires a higher sales value. *V'* must be at least as high as the owner's expectation of the future intrinsic value. The premium value under urban renewal conditions *(O' = V' – I)* is now very high compared to the situation without the urban renewal pro-

1 In the prospect theory of *Kahneman and Tversky* (1979) this behaviour is known as disposition effect. Since present losses are more aggravating than future ones the owner does not realize the loss but waits and hopes for better times.

gram. The demolition and the improvement subsidies on neighbouring properties and public space rise up the revenue expectations which blow up the option value of the property.

The option of temporary closedown or mothballing a house is promoted by a subsidy to preserve vacant historic buildings for houses that are of urbanistic interest. The subsidy helps to lower the one-time cost to close down the building and that raises primarily the intrinsic value of the property itself. The subsidy offers this option to a wider number of properties. It makes it easier to maintain the total value of the property including the other real options. To wait and to speculate for higher revenues in the future is cheaper and that may bolster the property values too.

It is presumed that intensive urban renewal activities in East Germany leads to a kind of overvaluation of properties compared to the West German market.

The next chapter presents a method to assess the valuation of property real options by comparing between the fundamental values of a property and its market value.

5 Assessing Real Options in the Housing Market

The techniques to assess the value of real option have been developed mostly on the basis of approaches to assess the value of stock options. The valuation formula developed by Black and Scholes for financial options is only transferable to real options if volatility and values of the underlying assets are observable or specified by discounted cash flows and scenario analysis. Therewith it is possible to calculate the value of single real options by analyzing decision trees or with a binomial approach (Brealy et al 2008, pp. 619 et sep.).

Quigg (1993) applies a method to measure the value of the option to wait with construction of free lots. A comparison group build lots is used to generate intrinsic values of fictive buildings on the free lots. Compared with the observable market values she computes the value of the option.

Since the bundle of housing market real options that is documented in Chapter 3 is linked to the presumption of an existing real estate bubble, I will adapt an assessment approach by Kanoh and Murase (1999). Their model is aimed at the explanation of the real estate bubble in Japan in the end of the 1980s and its burst in the 1990s. Real option approach indicates that the option value can be derived as a difference between market value and the fundamental value. The calculation of the fundamental value by a dividend discount model serves as an approximation of the intrinsic value:

$$Vf \equiv Vi \tag{1}$$

The principle of the dividend discount model (DDM) is a method of stock assessment and goes back to a study by Williams (1938). It targets to find a fair value without any speculative components. Therefore the value of a stock corresponds to the actual present value of the expected dividends which is replaced by rents in the case of real estate. The dividend rather the rent may have an assumed self financing growth rate like in the model of Gordon (1959) but if growth is uncertain Corporate Finance provides the Present Value of Growth Opportunities (PVGO). This concept divides the value of the enterprise into a component free of growth and the value of the growth options (Brealey et al. 2008, 106f). This is not far of reality because the value of land usually does not grow constantly by reinvesting profits, but by environmental events and processes.

Assuming durable capital and continuous rent payments, the fundamental value results from the net present value of perpetuity which is the constant rent divided by the interest rate i:

$$V_f = R/i. \tag{2}$$

The present Value of growth opportunities, which is the option value Vo in the world of real option theory, results from the observable market value.

$$V_m = \frac{R_j}{i} + Vo \tag{3}$$

In the context of the property real options the rent can be seen as the dividend of housing. But to adopt the concept to find the intrinsic value some specific adjustments are made.

Indeed, rents are revenues of the investor, but they pay not only for the invested company capital, but must also cover the operating expenses of real estate. Therefore only the effective earning E of the landlord should be used for the intrinsic value.

The operating expenses are repair costs, maintenance costs and if necessary administrative costs as well as legal costs. The maintenance reserve is calculated by a rule of thumb called Petersche Formula (Bogenstätter 2008, p. 205). The empirically founded says that within an 80 years lifecycle of a building the total maintenance costs (*CM)* sum up 1.5 fold the pure construction cost (*C)* of the building without nonrecurring expenses for property and land preparation:

$$CM\ per\ year = (C*1.5) / 80 \tag{4}$$

Furthermore the landlord bears the risk of vacancy. Therefore the nominal rent is reduced by the vacancy rate v_j in each city *j*.

The calculation of the intrinsic value V_i for rentable residential real estates in city *j* arises accordingly of the preceding considerations to:

$$Vi_j = \frac{r_j \times 12 \times (1 - v_j) - CM_j}{i} = \frac{E}{i} \tag{5}$$

The option value can be calculated by replacing $\frac{R_j}{i}$ in Equation 3 by Equation 5.

Strictly speaking the option value resulting from this algorithm should be interpreted as the sum of the present value of growth options of the build flat and proportional value of the property´s land.

Rents and housing prices for the year 2005 are taken from the Empirica (A) property price database. Rents are reported as median values in Euro per sqm for flats between 70 and 90 sqm. Prices are reported as median values in Euro per sqm for flats and condominiums in apartment houses except the new build first sale flats. Vacancy rates are published by Empirica (B) and the average building costs that are used in the calculation of the maintenance reserve are delivered by the german federal bureau of statistics (Statistisches Bundesamt). As discount rate serve the mean of the long term mortgage interest rate between 2004 and 2005. The interest rates are quarterly published by the federal bank of Germany (Deutsche Bundesbank).

6 Empirical Results

Due to the restricted availability of time series data of vacancy rates the empirical assessment is focused on the year 2005. Therefore the presented findings should be seen as an intermediary result. The sample consists of 92 of the 116 independent cities where consistent and reliable data on rents and vacancy was available. The sample includes 16 East German cities. Table 1 list up descriptive statistics of the variables and results of Formula 4. The average nominal option value of build properties is about one third of the average flat´s market value.

Table 1:
Assessment of the real option – descriptive results

Variable	Mean	St. Dev.	Min.	Max.
Monthly Net rent per sqm 2005 (*r*)	5.91	1.20	3.87	10.36
Market value of flats per sqm 2005 (*Vm*)	1500.38	367.96	714.00	2920.00
Earnings per sqm (*E*)	46.25	14.60	20.04	95.17
Intrinsic value per sqm (*Vi*)	993.24	313.66	430.46	2043.87
Nominal Option Value per sqm (*Vo = Vm –Vf*)	507.14	177.61	68.97	939.58

Source: Calculation by the IWH. Data by Empirica (A, B), Statistisches Bundesamt, Deutsche Bundesbank.

Comparing the values for East and West Germany reveals quite interesting differences. The option value in East Germany Value is at average 565.7 Euro, while the average Option in West Germany is only 494.8. The difference is not significant. But a comparison of nominal option values is not proper because each nominal option value is estimated with an individual regional market price. The option ratio *Vo/Vi* is a better measure to evaluate the existence of a regional bubble because of the normalization. Related to the intrinsic value the Option ratio of 68.5% is significantly higher in the East than in the West with only 52.9 % (Table 2).

Table 2:
East- West Comparison of Option values

	East n = 16	West n = 76	Significance (Mann-Whitney U-Test)
Nominal Option Value (*Vo = Vm –Vf*)	565,71	494,80	0,187
Option Ratio in % (*Vo/Vi**100)	68.54	52.86	0,038

Source: Calculation by the IWH. Data by Empirica (A, B), Statistisches Bundesamt, Deutsche Bundesbank.

Remember that urban renewal spending is much higher in East that in West Germany. Therefore it is likely that the high level of option values in East Germany is caused more by the regional allocation of the subsidies than simply by location. Unfortunately the strong and highly significant correlation between the urban renewal spending (URB_REN) and the East-West Dummy (EAST) makes it difficult to identify the influence of both variables together. Table 3 show the results of the correlation of Option Ratio (*Vo/Vi*). The correlation analysis indicates clearly that urban renewal spending contributes to high option values and might be responsible for the above average option values in East Germany.

Table 3:
Correlations (Spearman Rho) of the Option Ratio

	URB_REN	EAST=1
Option Ratio in % (*Vo/Vi**100)	0.304 (0.003)	0.217 (0.038)
EAST=1	0,651 (0.000)	1 -
2-side significance in brackets. Sample of 92 cities; 16 in East Germany 76 in West Germany.		

Source: Calculation by the IWH. Data by Empirica (A,B), Statistisches Bundesamt, Deutsche Bundesbank, INKAR.

Nevertheless, there is no doubt that a more detailed statistical model is required to find out a good estimate for the Urban Renewal influence on the Option value.

7. Conclusion

The empirical results provide some evidence for the hypothesis that massive provision of money for urban renewal in East Germany leads to a stabilization and prolongation of the real estate bubble that has emerged in the 1990s. This policy is good for housing companies, landlords and their financing banks that are interested in worthy collateral. But landlords and investors in East Germany should not forget that this situation might be very fragile and instable. A recent evaluation study on the Urban redesign program recognizes that an actual consolidation of the flat market is not to be ascertained (Aehnelt 2008, p. 341). Vacancy rates have not decreased permanently, the sales rate of houses is still very low and many buildings are abandoned. Given the assumptions and considerations of the real option approach, the urban renewal measures have potential to block up an economic change in the real estate market. This is a policy implication that is mentioned already by Titman (1995) and has been discussed in Weiß (2008b) for East Germany. Therefore the poor outcome of the program regarding the investment stimulus is not surprising. High option values are on the one hand a hurdle for new investors, because returns of investment are very low, or even negative. The current owners on the other hand have no incentive to change current apartment building structures into modern and attractive homes because they hope that the urban renewal activities will turn around the market.

Neglecting these considerations the official program evaluation, that will be the basis for political decisions, recommends the continuation of the program at least until 2016 (Aehnelt 2008, p. 317).

To prevent the latent crash of real estate values with dramatic equity losses for landlords and banks this policy could be the lesser evil. But the continuous distortion of the housing market may have consequences for homebuyers, tenants and the construction industry. Since these transaction costs of the program are still unknown, it is hardly to say whether a burst of the option driven bubble would be worse or better. But one is clear: as long the bubble is alive there is the danger of burst. And it is generally not very healthy if price relations of a market are dominated by subsidies. An upcoming study on the temporal development of real option values should examine indicators for a slowly controlled collapse of the bubble. Furthermore it would be interesting to model the effects of fading out the above average urban renewal spending for East Germany.

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